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EXAMINER	
COLON, GERMAN	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 10/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,285	SETLUR ET AL.	
	Examiner	Art Unit	
	German Colón	2879	

-- Th MAILING DATE of this communication appears on th cov r sh et with th correspondence address --

Period for R ply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17 and 64* is/are allowed.

6)☒ Claim(s) *1-14,16,18-23,25,26,51-56,58 and 61-63* is/are rejected.

7)☒ Claim(s) *15,24,27-50,57,59 and 60* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

The specification refers to oxides of a Group-IIIB metal selected from the group consisting of Al, Ga and In. The Examiner notes that Al, Ga and In belong to the Group-IIIA of the Periodic Table.

Appropriate correction is required.

Claim Objections

2. Claims 1-8, 10-16, and 18-63 are objected to because of the following informalities:

Claims 1, 10, 18, 28, 40, 51, and 61 refer to oxides of a Group-IIIB metal selected from the group consisting of Al, Ga and In. However, Al, Ga and In belong to the Group-IIIA of the Periodic Table.

Claims 2-8, 11-16, 19-27, 29-39, 41-50, 52-58 and 62-63, are objected for the reasons stated above, because of their dependency status from claims 1, 10, 18, 28, 40, 51, and 61, respectively.

Regarding claim 59, claim 59, line 5 has the term "phosphor blend" twice.

Regarding claim 60, claim 60 is objected for the reason stated in claim 59.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 18, 20-23 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitai et al. (US 5,788,882).

Regarding claim 1, Kitai discloses a phosphor comprising oxides of at least an alkaline-earth metal selected from the group consisting of Sr and Ca, and oxides of a Group-IIIA metal, said metal being Ga, said phosphor being activated with ions of at least a rare-earth metal comprising at least Eu, said phosphor having the formula $(M_{1-x}RE_x)_yGa_2O_4$ (see Col. 8, line 10, and Col. 9, lines 14, and 35-36);

wherein M is at least an alkaline-earth metal, RE is Eu; $0.001 < x < 0.3$; and y satisfy a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$.

Regarding claim 18, Kitai discloses a method for producing a phosphor, comprising:

(a) providing amounts of oxygen-containing compounds of at least a rare-earth metal comprising at least europium, at least an alkaline-earth metal selected from the group consisting of strontium, barium, and calcium; and at least a Group-IIIA metal, said metal being Ga;

(b) mixing together said oxygen-containing compounds to form a mixture; and

(c) firing said mixture in a reducing atmosphere at a temperature and for a time sufficient to convert said mixture to said phosphor having a formula of $(M_{1-x}RE_x)_yGa_2O_4$ (see Col. 8, line 10, and Col. 9, lines 14, and 35-36);

wherein M is at least an alkaline-earth metal, RE is Eu; $0.001 < x < 0.3$; and y satisfy a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see Col. 6, lines 4-10).

Regarding claim 20, Kitai discloses said oxygen-containing compounds being oxides (see Col. 6, lines 4-6).

Referring to claims 21 and 22, Kitai discloses the firing being carried out at a temperature in a range from about 900°C to about 1300°C (see Col. 6, lines 7-8).

Referring to claim 23, Kitai discloses the firing being carried out at a substantially constant temperature.

Referring to claim 25, Kitai discloses the firing being carried out for a time from about 1 minute to about 10 hours (see Col. 6, lines 8).

5. Claims 1-9, 18, 20, 21, 23, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Murayama et al. (US 5,424,006).

Regarding claim 1, Murayama discloses a phosphor comprising oxides of at least an alkaline-earth metal selected from the group consisting of strontium, barium, calcium, and combinations thereof and oxides of at least a Group-IIIA metal, said metal being aluminum, and combination thereof, said phosphor being activated with ions of at least a rare-earth metal comprising at least europium, said phosphor having a formula of $(M_{1-x}RE_x)_yAl_2O_4$;

wherein M is said at least an alkaline-earth metal; RE is said rare-earth metal comprising at least europium; D is said at least a Group IIIA metal, $0.001 < x < 0.3$, and y satisfies a

condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see Tables 9-20, Col. 19, lines 1-3 and 18-20).

Regarding claim 2, Murayama discloses said phosphor absorbing electromagnetic radiation in a wavelength range from 350 nm to about 480 nm, and having an emission peak in a wavelength range from about 500 nm to about 600 nm (see Col. 2, line 39, and Figs. 13B, 14B and 15).

Regarding claim 3, Murayama discloses the phosphor being doped with at least an additional rare-earth metal selected from the group consisting of cerium, praseodymium, neodymium, samarium, gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium (see at least Tables 9-20).

Referring to claim 4, Murayama discloses said at least an additional rare-earth metal comprises from about 0.001 to about 30 atom percent of a total of said at least an alkaline-earth metal, said europium, and said at least an additional rare-earth metal (see at least Tables 9-20).

Referring to claims 5 and 6, Murayama discloses said at least an additional rare- earth metal comprises from about 0.001 to about 20 atom percent of a total of said at least an alkaline-earth metal, said europium, and said at least an additional rare-earth metal (see at least Tables 9-20).

Referring to claim 7, Murayama discloses the phosphor further comprising Mg (see Col. 19, lines 1-3 and 19-20).

Referring to claim 8, Murayama discloses said Mg comprising from 0.001 to about 20 atom percent of said at least an alkaline-earth metal (see Col. 19, lines 1-3 and 19-20; and Fig. 18).

Regarding claim 9, Murayama discloses a phosphor comprising Sr and Al, activated with Eu ions, said phosphor having the formula of $(Sr_{1-x}Eu_x)_yAl_2O_4$; wherein $0.001 < x < 0.3$, and y satisfies a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see at least Tables 9-20).

Regarding claim 18, Murayama discloses a method for producing a phosphor, comprising:

(a) providing amounts of oxygen-containing compounds of at least a rare-earth metal comprising at least europium, at least an alkaline-earth metal selected from the group consisting of strontium, barium, and calcium; and at least a Group-IIIA metal, said metal being Al;

(b) mixing together said oxygen-containing compounds to form a mixture; and

(c) firing said mixture in a reducing atmosphere at a temperature and for a time sufficient to convert said mixture to said phosphor having a formula of $(M_{1-x}RE_x)_yAl_2O_4$ (see Col. 4, lines 7-13);

wherein M is at least an alkaline-earth metal, RE is Eu; $0.001 < x < 0.3$; and y satisfy a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see at least Tables 9-20).

Regarding claim 20, Murayama discloses the oxygen-containing compounds being oxides (see Col. 4, lines 7-11).

Regarding claim 21, Murayama discloses the firing being carried out at a temperature in a range from about 900°C to about 1300°C (see Col. 4, line 13).

Referring to claim 23, Murayama discloses the firing being carried out at a substantially constant temperature.

Referring to claim 25, Murayama discloses the firing being carried out for a time from about 1 minute to about 10 hours (see Col. 4, line 13).

Referring to claim 26, Murayama discloses the firing being carried out in an atmosphere comprising H gas.

6. Claims 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Hase et al. (US 6,190,577).

Regarding claim 18, Hase discloses a method for producing a phosphor, comprising:

(a) providing amounts of oxygen-containing compounds of at least a rare-earth metal comprising at least europium, at least an alkaline-earth metal selected from the group consisting of strontium, barium, and calcium; and at least a Group-IIIA selected from Al and In;

(b) mixing together said oxygen-containing compounds to form a mixture (see Col. 6, lines 35-45); and

(c) firing said mixture in a reducing atmosphere at a temperature and for a time sufficient to convert said mixture to said phosphor having a formula of $(M_{1-x}RE_x)_yAl_2O_4$;

wherein M is at least an alkaline-earth metal, RE is Eu; $0.001 < x < 0.3$; and y satisfy a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see Col. 2, lines 33-56).

Regarding claim 19, Hase discloses adding at least a halide of at least a metal selected from the group consisting of rare-earth metals, strontium, barium, calcium, aluminum, gal4ium, indium, and combinations thereof (see Col. 5, line 63 to Col. 6, line 3).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 10, 11, 13, 14, 51, 52, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al. (US 6,278,135) in view of Murayama et al. (US 5,424,006).

Regarding claim 51, Srivastava discloses a light source comprising:

(a) at least one LED that is capable of emitting a radiation having wavelengths in a range from about 315 nm to about 480 nm, and

(b) a phosphor casting comprising particles of a phosphor blend comprising:

(1) a first phosphor comprising oxides of at least an alkaline-earth metal, said alkaline-earth metal being strontium, and oxides of at least a Group-IIIA metal, said metal being aluminum, said phosphor being activated with ions of at least a rare-earth metal comprising at east europium;

(2) at least an additional phosphor selected from the group consisting of phosphors that are excitable by radiation having wavelengths in a range from about 315 nm to about 480 nm that have a peak emission in at least one of blue, blue-green, green, yellow-orange, and red light wavelengths.

Srivastava discloses the first phosphor being $SrAl_2O_4:Eu^{2+}$ but is silent regarding the limitation of "having the formula of $(M_{1-x}RE_x)_yAl_2O_4$; wherein $0.001 < x < 0.3$, and y satisfies a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$".

However, in the same field of endeavor, Murayama discloses a phosphor having the formula of $(M_{1-x}RE_x)_yAl_2O_4$; wherein M is at least one of Sr, Ca and Ba, RE is a rare-earth metal comprising at least Eu, $0.001 < x < 0.3$, and y satisfies a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$, and teaches said phosphor to show excellent afterglow characteristics that last much longer that prior phosphors, to be chemically stable and to show excellent photo-resistance over a long time (see Col. 1, lines 55-60 and Tables 9-20). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the phosphor disclosed by Murayama in the LED disclosed by Srivastava, in order to provide a phosphor which has afterglow characteristics that last much longer that prior phosphors, which is chemically stable, and that shows excellent photo-resistance over a long time.

Regarding claim 52, Srivastava-Murayama discloses said first phosphor comprising Mg in an amount from 0.001 to about 20 atom percent of said at least an alkaline-earth metal (see '006, Col. 19, lines 1-3 and 19-20; and Fig. 18).

Regarding claims 55 and 56, Srivastava-Murayama discloses said peak emission in said blue-green and green light wavelengths being in a range from about 480 nm to about 550 nm (see '135, Table 1).

Regarding claims 10, 11, 13 and 14, claims 10, 11, 13 and 14 are rejected over the reasons stated in the rejection of claims 51, 52, 55, and 56, respectively.

9. Claims 10-12, 16, 51-54, 58, and 61-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Höhn et al. (US 6,066,861) in view of Murayama et al. (US 5,424,006).

Regarding claim 51, Höhn discloses a light source comprising:

(a) at least one LED that is capable of emitting a radiation having wavelengths in a range from about 315 nm to about 480 nm, and

(b) a phosphor casting comprising a transparent material and particles of a phosphor blend (see Figs. 1-5 and Col. 4, lines 46-52);

the phosphor blend comprising a green emitting phosphor and a red emitting phosphor, said green and said red emitting phosphor being excitable by radiation having a wavelength in a range from 315 to about 480 nm (see Col. 6, lines 11-12 and 16-18). Höhn is silent regarding the green emitting phosphor composition.

However, in the same field of endeavor, Murayama discloses a phosphor having the formula of $(M_{1-x}RE_x)_yAl_2O_4$; wherein M is at least one of Sr, Ca and Ba, RE is a rare-earth metal comprising at least Eu, $0.001 < x < 0.3$, and y satisfies a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$, and teaches said phosphor to show excellent afterglow characteristics that last much longer that prior phosphors, to be chemically stable and to show excellent photo-resistance over a long time (see Col. 1, lines 55-60 and Tables 9-20). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the phosphor disclosed by Murayama in the LED disclosed by Höhn, in order to provide a phosphor which has afterglow characteristics that last much longer that prior phosphors, which is chemically stable, and that shows excellent photo-resistance over a long time.

Regarding claim 52, Höhn-Murayama discloses said first phosphor comprising Mg in an amount from 0.001 to about 20 atom percent of said at least an alkaline-earth metal (see '006, Col. 19, lines 1-3 and 19-20; and Fig. 18).

Referring to claim 53, Höhn-Murayama discloses the phosphor casting comprising particles of a light-scattering material (see '861, Col. 3, lines 44-45).

Referring to claim 54, Höhn-Murayama discloses the blue light in a range of about 400 nm to about 480 nm (see '861, Col. 5, line 34).

Referring to claim 58, Höhn-Murayama discloses the red light in a range of about 610 nm to about 700 nm.

Referring to claim 61, Höhn-Murayama discloses a light source (see Figs. 1-4 of '861) comprising:

(a) a plurality of LEDs attached to a reflective panel (**8,16**), said LEDs being capable of emitting a radiation having wavelengths in a range from about 315 nm to about 480 nm; and

(b) a phosphor coating comprising a polymeric binder and particles of a phosphor blend dispersed therein (see Col. 5, lines 52-56), said coating being disposed in a direction of radiation emitted from said LEDS, said phosphor blend comprising:

(1) a first phosphor comprising oxides of at least an alkaline-earth metal selected from the group consisting of strontium, barium, calcium, and combinations thereof and oxides of at least a Group-IIIA metal, said metal being aluminum, and combination thereof, said phosphor being activated with ions of at least a rare-earth metal comprising at least europium, said phosphor having a formula of $(M_{1-x}RE_x)_yAl_2O_4$;

wherein M is said at least an alkaline-earth metal; RE is said rare-earth metal comprising at least europium; D is said at least a Group IIIA metal, $0.001 < x < 0.3$, and y satisfies a condition selected from the group consisting of $0.75 < y < 1$ and $1 < y < 1.1$ (see '006, Tables 9-20, Col. 19, lines 1-3 and 18-20); and

(2) at least an additional phosphor selected from the group consisting of phosphors that are excitable by radiation having wavelengths in a range from about 315 nm to about 480 nm that have a peak emission in at least one of blue, blue-green, green, yellow-orange, and red light wavelengths. Same reasons for combining stated in claim 51 apply.

Regarding claim 62, Höhn-Murayama discloses the phosphor casting comprising particles of a light-scattering material (see '861, Col. 3, lines 44-45).

Regarding claim 63, Höhn-Murayama discloses a seal disposed around a totality of said panel, said LED and said phosphor coating (see '861, Fig. 5).

Referring to claims 10-12 and 16, claims 10-12 and 16 are rejected over the reasons stated in the rejection of claims 51, 52, 54 and 58, respectively.

Allowable Subject Matter

10. Claims 17 and 64 are allowed.

11. Claims 15, 24, 27 and 57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claims 28-50 and 59-60 would be allowable if rewritten or amended to overcome the objection set forth in this Office action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to German Colón whose telephone number is 703-305-5987. The examiner can normally be reached on Monday thru Friday, from 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 703-305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gc

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